Title:

Apparatus for wet abrasive blasting

United States Patent 3343304

Abstract:

1,135,274. Blasting. A. H. EPPLER. 7 March, 1966 [12 March, 1965], No. 9830/66. Heading B3D. A method of wet abrasive blasting through a conventional blast nozzle having slurry and gas inlets comprises the steps of pressurizing a quantity of slurry, maintaining said quantity of slurry in homogeneous suspension, and delivering the homogeneous slurry from said quantity to the nozzle under the pressure to which said quantity of slurry is subject. Wet abrasive blasting apparatus comprises a vessel for containing slurry, said vessel being divided into upper and lower portions by a perforated partition which constitutes a baffle and being provided with means for transferring slurry from the lower portion to the upper portion at a rate which is greater than the rate of sedimentation of the slurry through the baffle, means for raising the pressure within the vessel above atmospheric pressure and means for discharging slurry under such pressure from the upper portion of the vessel. A treatment chamber 6, Fig. 1, has bars 8 upon which the workpiece 10 is supported; the workpiece is accessible to the operator through a sleeve 12 optionally provided with a glove-like closure at its inner end. Used slurry collects in a sump 16 and is withdrawn by a centrifugal pump 20 having a discharge pipe 28 returning slurry to the sump and a discharge pipe 30 connected through a valve 36 to a pressure vessel 38. When filling the vessel air is vented therefrom through valve 42 and line 40. A pipe 50 controlled by a valve 52 may be used to drain the vessel 38; it is shown as fitted with a pressure gauge 54. A circulating screw 48 is rotated at high speed by a motor 90 and its intermediate part is enclosed by a tubular casing 94; the screw takes slurry from the bottom of the vessel 38 and delivers it at 100. A baffle 110 has a very large number of small openings 112. When the vessel 38 has been filled, by opening the valve 36, with slurry to the approximate level from which the vent line 40 opens, the vessel 38 is subjected to air pressure from the air line 86 through line 114, manually

adjustable valve 116 and shut-off valve 118. The pressure in air line 86 may be 90 p.s.i. and that in the vessel 85 p.s.i. The screw 48 is then driven to withdraw slurry from below the baffle 110 at a rate in excess of the rate at which slurry will flow through the baffle apertures. Slurry from the area immediately above the baffle passes through supply pipe 120 and solenoid valve 122 to the slurry inlet 32 of the treatment nozzle 14; the nozzle has a compressed air inlet 34. In a modification, Figs. 3 and 4, two vessels 38 are provided. Multiple workpieces 11 are mounted on studs 13 projecting radially from a turret 15 which can be indexed through 90 degrees. The treatment chamber 7 has a loading station A, treating stations B, C and a rinsing station D. In treating station B nozzles 25 are carried by a cross-head 27 movable by a ram 35 in a cylinder 37. In treating station C nozzles 41 are movable by a ram 39. At station D liquid and air nozzles 45, 47 remove slurry from the workpieces. The vessels have pick-up lines 120 with control valves 122; slurry from one or other of the vessels passes through line 126 to a manifold 128 having outlets 130 connected by hoses 132 to the nozzles. The valves 421 controlling the venting of the vessels 38, the valves 361 controlling slurry delivery by the pump 20 from the sump 18 to the vessels 38, the valves 117 controlling the pressurizing of the vessels 38 from the air line 86, the valves 122 controlling slurry delivery from the vessels 38, and the valves 89 controlling the admission of air to the header 91 serving the nozzles are all controlled electrically for a sequence timer 150 correlated with the gear-box 154 for indexing the turret 15. The timer function is further regulated from upper and lower limit switches 156, 158 operating magnetically according to the position of armature member 160 carried by a float 162. Slurry is drawn from one vessel 38 while the other is being recharged. The abrasive may be manufactured grits consisting of grains or powders of heat-treated aluminium oxide, silicon carbide, boron carbide, tungsten carbide or oxides of cerium and zirconium, or natural grits such as diamond, quartz, quartzite, tripoli, garnet, flint, jadeite, nephrite &c. The carrier may be water, kerosene, methyl orange, varsol, light petroleum lubricating oils and other low flash point solvents. Alkalizing agents are preferably used in the carrier to maintain the pH not lower than 7 and preferably as high as 10.

Inventors:

Eppler, Arthur H.

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Assignee:

Eppler, Arthur H.

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